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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/817,179	04/02/2004	Lawrence Clevenger	YOR920010518US1	2397
7590 09/22/2005			EXAMINER	
Paul D. Greeley, Esq. Ohlandt, Greeley, Ruggiero & Perle, L.L.P. One Landmark Square, 10th Floor Stamford, CT 06901-2682			LE, THAO P	
			ART UNIT	PAPER NUMBER
			2818	
DATE MAILED: 09/22/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

4A

Office Action Summary	Application No.		Applicant(s)	
	10/817,179		CLEVINGER ET AL.	
	Examiner		Art Unit	
	Thao P. Le		2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-24 are pending in this application.

Drawings

The drawings are objected to for the following reason:

The drawings are objected to under 37 CFR 1.83(a) because they fail to show the reference numerals such as 90, 100, 110, 120, and 130 as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 4, 9-11, 23, 24 are rejected under 35 USC 102 (e) as being anticipated by Davis et al., U.S. Patent No. 6,815,346.

Regarding claims 1, 23, 24, Davis et al. discloses a method for forming a low dielectric constant semiconductor comprising (See Figs. 5, 6A-6H, and Cols. 1-8): forming a first metal wiring 52 on a substrate, forming an insulating support structure 77 having K1, forming and then planarizing a second insulating material 79 having K2 on the support structure, forming a polish-stop layer 50, forming a plurality of metal studs 77/75, forming a second metal wiring 102, forming interconnects between the first metal wiring and second metal wiring via the metal studs.

Regarding claim 3, Davis et al. discloses the dielectric constant K2 is lower than the dielectric constant K1 (lines 12-14, Col. 6).

Regarding claim 4, Davis et al. discloses the first metal layer is patterned by a process selected from the group comprising damascene (Figs. 5-6H).

Regarding claims 9-11, Davis et al. discloses the planarizing step is carried out by CMP and the metal studs are formed by damascene process (Figs 6A-6H).

Jain, U.S. Patent No. 5,821,168, Buynoski et al., U.S. Patent No. 6,207,553, Loh et al., U.S. Patent No. 6,670,237, and Babich et al., U.S. Patent No. 6,815,329 also disclose the limitations cited in claims 1, 23-24.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5-8, 12-13, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al., U.S. Patent No. 6,815,346.

Regarding claim 2, Davis et al. doesn't disclose the method of claim 1 above and further comprising repeating each of the steps. However, it would have been obvious to one having ordinary skill in the art that repeating steps where the processes are substantially identical or equivalent in terms of function, manner and result, was held to not patentably distinguish the processes. Ex party Rubin 128 USPQ 440 (PTO BdPatApp 1959).

Regarding claims 5-6, it is well known in the art that the insulating material such as polymers or organic polymers are formed by the method selecting from contact

printing because the contact printing process allows it to print thin polymers, organic polymers without spread out to unwanted locations.

Regarding claims 7-8, Davis et al. discloses the step of forming the second insulating material comprising the steps of forming a non-porous material (inorganic, nonporous SiLK) but fails to disclose the insulating material having a spacer and removing the spacer. However, it would have been obvious to one having ordinary skill in the art to form a spacer and then remove the spacer because spacer can acts as a mask in the process of etching vias/openings and it is inherent that the removing step to remove the inorganic nonporous SiLK is carried out by heating.

Regarding claims 12-13, 15-16, Davis et al. discloses the insulating materials having low dielectric constant K but fails to disclose Ks are less than 2, 1.8, 3, or 4. However, The selection of such parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, or in combination of the parameters would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to

discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Claims 14, 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al., U.S. Patent No. 6,815,346, in view of Babich et al., U.S. Patent No. 6,815,329.

Regarding claims 14, 17-22, Davis et al. fails to disclose the insulating materials are selected from the group comprising polymers, organic polymers, porous organic. Babich et al. discloses the method of forming low dielectric constant comprising the steps of forming low dielectric constant insulating materials selecting from nonporous or porous organic materials (lines 20-55, Col. 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use insulating materials are selected from the group comprising polymers, organic polymers, porous organic materials because these materials relating to the incorporation of voids, cavities or air gaps for reducing wiring capacitance (Col. 1).

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao P. Le whose telephone number is 571-272-1785. The examiner can normally be reached on M-T (7-6).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A handwritten signature in black ink, appearing to read 'Thao P. Le'. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Thao P. Le

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